Citation:

Patil SR, Cates S, Morales R. Consumer food safety knowledge, practices and demographic differences: Findings from a meta-analysis. *J Food Prot.* 2005 Sep; 68 (9): 1,884-1,894.

PubMed ID: 16161688

Study Design:

Meta-Analysis

Class:

M - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

The purpose of this study was to use meta-analysis to:

- Identify gaps where additional research is needed to fully evaluate consumers' risky food handling and consumption practices
- Evaluate differences in knowledge versus reported practices for various consumer behaviors and demographic sub-population categories (i.e. gender, ethnicity, age, income, education, geographical region and metropolitan status)
- Evaluate differences in reported risky behaviors among demographic sub-populations.

Inclusion Criteria:

- Studies that evaluated United States consumers' knowledge or reported behaviors in units of mean percentages or proportions (effect sizes)
- Studies published since 1992
- Studies providing sample size information and reporting the demographic characteristics of the respondents.

Exclusion Criteria:

None specifically mentioned

Description of Study Protocol:

Recruitment

Studies were retrieved from various journals and surveys from government and private organizations. 20 studies were eligible for inclusion in the meta-analysis.

Design

Meta-Analysis

Dietary Intake/Dietary Assessment Methodology

Not applicable

Blinding used

Not applicable

Intervention

Not applicable

Statistical Analysis

- Findings from 20 studies were combined using meta-analysis methods to estimate percentages of consumers engaging in risky behaviors, such as consumption of raw food, poor hygiene and cross-contamination, separated by various demographic categories
- Effect size, standard error and inverse variance weight for each study were calculated for each risky behavior and demographic category combination
- Standard errors were estimated to reflect sampling error and between-study random variation
- The significance of the mean effect size was confirmed using the Z-test
- The homogeneity of the effect size distribution was evaluated using the Q-test
- To evaluate whether the difference between knowledge and the reported use of a safe handling practice for a demographic category was significant, the Z-test was used
- The statistical significance of differences in behaviors was evaluated across demographic categories and across behavioral measures using ANOVA.

Data Collection Summary:

Timing of Measurements

Not applicable

Dependent Variables

The following behavioral measures were included in the meta-analysis:

- Consumption of raw or undercooked ground beef, eggs, shellfish and milk
- Knowledge of good hygiene practices, practices to prevent cross-contamination, proper defrosting methods, apparently safe food sources and proper cooking and heating practices
- Handling practices for hygiene, prevention of cross-contamination, food holding, cold storage, avoidance of unsafe foods and cooking and heating.

Independent Variables

The following demographic characteristics were included in the meta-analysis:

- Gender
- Ethnicity
- Age

- Education
- Geographic region
- Metropolitan vs. non-metropolitan.

Control Variables

Description of Actual Data Sample:

- ***Initial N****:* 20 studies were identified
- ***Attrition (final N):*** 20 studies
- ***Age****:* Not applicable
- ***Ethnicity****:* Not applicable
- ***Other relevant demographics****:* None specified
- ***Anthropometrics:*** None specified
- ***Location***: United States.

Summary of Results:

Key Findings

- For all behaviors evaluated in the meta-analysis, consumer knowledge of safe handling practices does not correspond with reported use of the practices, suggesting that knowledge is a poor indicator of actual behavior
- Knowledge of good hygiene practices exceeded reported use of such practices by 10% for the total sample
- Knowledge of practices to prevent cross-contamination exceeded reported use of such practices by 18.2% for the total sample
- There were considerable differences in behaviors across demographic categories, possibly because of socioeconomic and cultural differences
- For most demographic categories, consumers' reported use of practices for proper cold storage, avoiding foods from unsafe sources and proper cooking and heating exceeded their knowledge of safe practices
- Reported use of practices for avoiding foods from unsafe sources exceeded knowledge of safe practices for 32.3% for the total sample
- Reported use of practices for proper cold storage exceeded knowledge of safe practices by 11.4% for the total sample
- Reported use of proper practices for cooking and heating exceeded knowledge of safe practices by 10.6% for the total sample
- Compared with women, men reported greater consumption of raw or undercooked foods (26.7%), poorer hygiene, poorer practices to prevent cross-contamination and less safe defrosting practices
- Mid-age adults consumed more raw food (except milk, 24.7%) than did young adults and seniors
- High-income individuals reported greater consumption of raw foods (29%), less knowledge of hygiene and poorer cross-contamination practices
- The highest raw ground beef and egg consumption (29%) and the poorest hygiene and cross-contamination practices were found in the United States Mountain region
- More people consumed raw or undercooked eggs (47%) than consumed raw or undercooked

ground beef (21%), shellfish (12%) and raw milk (2.1%)
- Consumption of raw or undercooked food varied by gender, ethnicity, age, income, education level and region
- Consumers were more knowledgeable about good hygiene practices (88%), practices to prevent cross-contamination (86%) and safe food holding practices (84%) than they were about the other practices included in the analysis
- Reported use of good hygiene practices (78%) and proper cooking and heating practices (77%) were more widespread compared with other practices included in the analysis.

Author Conclusion:

Meta-analysis was useful for identifying important data gaps and demographic groups with risky behaviors, and this information can be used to prioritize further research. Generally, differences between knowledge and reported use of safe handling practices were greatest for men, young and mid-age adults and individuals with more than a high school education; these individuals do not necessarily have a higher incidence of foodborne illnesses. Further research is needed on the socioeconomic factors and other population characteristics that could explain the differences in safe handling practices and risky food consumption habits by demographic categories identified in this analysis.

Reviewer Comments:

Search terms and databases not described. Study quality and validity not assessed.

Research Design and Implementation Criteria Checklist: Review Articles

Relevance Questions		
1.	Will the answer if true, have a direct bearing on the health of patients?	Yes
2.	Is the outcome or topic something that patients/clients/population groups would care about?	Yes
3.	Is the problem addressed in the review one that is relevant to nutrition or dietetics practice?	Yes
4.	Will the information, if true, require a change in practice?	Yes

Validity Questions		
1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search termsused described?	No
3.	Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?	Yes

4.	Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?	No
5.	Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?	???
6.	Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?	Yes
7.	Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issued considered? If data from studies were aggregated for meta-analysis, was the procedure described?	Yes
8.	Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?	Yes
9.	Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?	Yes
10.	Was bias due to the review's funding or sponsorship unlikely?	Yes